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Biography Dariush Divsalar received the Ph.D. degree in electrical engineering from UCLA, in 1978. Since then, he has been with the Jet Propulsion Laboratory (JPL), California Institute of Technology (Caltech), where he is a Principal and Senior Research Scientist. At JPL, he has been involved with developing state-of-the-art technology for advanced deep space communications systems and future NASA space exploration. Since 1986, he has taught graduate courses in information theory, communications, and coding at UCLA and Caltech. He has published more than 200 papers, coauthored a book entitled An Introduction to Trellis Coded Modulation with Applications, contributed to two other books, and holds 19 U.S. patents in the above areas. He was co-recipient of the 1986 paper award of the IEEE Transactions on Vehicular Technology. He was also co recipient of the joint paper award of the IEEE Information Theory and IEEE Communication Theory societies in 2008. The IEEE Communication Society has selected one of his papers for inclusion in a book entitled The Best of the Best: Fifty Years of Communications and Networking Research, containing the best 56 key research papers ever published in the Society's 50-year history. He has received over 40 NASA Tech Brief awards and a NASA Exceptional Engineering Achievement Medal in 1996. He served as an Area Editor for the IEEE Transactions on Communications from 1989 to 1996. He became a Fellow of IEEE in 1997 for contributions to the analysis and design of coding and modulation techniques for satellite, mobile, and deep-space communication systems.

Education

- 1977-78 Ph.D., Electrical Engineering, University of California, Los Angeles, 1978.
- Major: Communication Systems, Department of Electrical Engineering.
- Minor: Computer System Modeling and Analysis, Department of Computer Science.

- Minor: Applied Mathematics, Department of Mathematics.

- 1975-77 Engineer Degree, University of California, Los Angeles (UCLA), June 1977
- 1973-75 M.S., Electrical Engineering, University of California, Los Angeles (UCLA), March 1975.

Research Interests

- Research in digital communication systems, wireless communication systems, bandwidth efficient combined coding modulation techniques, digital signal processing, satellite communications, mobile communications.
- Channel coding for deep space communications.
- Spread Spectrum Systems, CDMA, Fast Frequency Hopping, Time Hopping for commercial multiple access systems, Acquisition and tracking for spread spectrum communications, Mutual User Interference Cancellation for CDMA, Turbo codes, LDPC codes and Iterative Decoding for power- and Bandwidth- limited Channels.

Professional Experience

- Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA (1978 - present)
- 2000 Principal Scientist
- 1999 Senior Research Scientist
- 1997 Principal of Engineering Staff.
- 1989 Senior Member of Technical Staff.
- 1982 Member of Technical Staff.
- 1978 Senior Engineer.

- Lecturer at UCLA, Electrical Engineering Department (1986 - 1996)
- Taught graduate courses in Information Theory, Digital Communications, Coding (TCM, and turbo codes), and Spread Spectrum Communications.

- Lecturer at Caltech, Electrical Engineering Department (1997 - 2001)
- Taught graduate courses in Random Signals and Communications theory
- Teaching accomplishments at Caltech:
- Taught graduate courses EE162, EE163a, EE163b at Caltech since January 1997.
- Participated in Ph.D. Qualifying Exams, Ph.D. Candidacy Exams, and Ph.D. defense committees for many graduate students at Caltech.
- Helped students in their research, gave new ideas for research.

- Adjunct Professor at Northrop University (1984 - 1991)
- Taught courses in analog and digital communication systems, information theory and error control coding, statistical communication theory, digital communications, probability, stochastic processes, feedback control systems, spread spectrum communications, linear networks, computer networks, digital signal processing.

- Distinguished Lecturer at West Coast University (1982 - 1996)
- Taught courses in Detection of Signals in Noise, Digital Communication Systems, Coding, Probability, Stochastic Processes, Logic Network Design, Digital Signal Processing, Spread Spectrum.

Awards **IEEE Paper Award**

- Best paper of the year award for "The Performance of Trellis Coded Multilevel DPSK in a Fading Mobile Satellite Channel" published in IEEE Transactions on Vehicular Technology, Vol. 37, No. 2, May 1988. Award was given out in 1990.
- Joint paper award of the IEEE Information Theory and IEEE Communication Theory societies for ``Accumulate Repeat Accumulate Codes" published in April 2007. Award was given in 2008.

IEEE Transaction on Communications Best Papers Over Past 50 Years

- D. Divsalar and M. K. Simon, "Multiple Symbol Differential Detection of MPSK," IEEE Transactions on Communications March 1990. This paper has been selected as one of the best 56 key research papers in communications and networking over the past fifty years. It was published in a book entitled "The Best of the Best, Fifty Years of Communications and Networking Research," by the Institute of Electrical and Electronics Engineers (IEEE) Press and Wiley-Interscience, 2007.

Highly Cited Publishing Researcher

- D. Divsalar was recognized as highly cited researcher for the period 1981-1999. Highly cited comprise less than one-half of one percent of all publishing researchers worldwide with truly extraordinary accomplishment s in category of Computer Science.

JPL Publications Best Paper Award

- 1998 Hugh Fosque best paper for ``Code Performance as a function of block size." 2000 best paper for ``A simple tight bound on error probability of block codes with application to turbo codes," The results also published in the book *Performance analysis of linear codes under ML decoding: A tutorial* by Igal Sason and Shlomo Shamai, NOW Publishers, Delft, the Netherlands, 2006.

Group Achievement Award

- Advanced Communication Technology Satellite Mobile Terminal Development Team, 1994.
- Project Galileo Team, 1996.
- Galileo Orbital Operation Recovery Team, 1997.
- Turbo Code Development Team, 1998.
- Uplink Coding Team, 2008.
- Coding, Modulation, and Link Protocol Study Team, 2009.

NASA Award

- NASA Exceptional Engineering Achievement Medal, April 9, 1996.

New Technology Reports and Awards:

1. NASA Tech Brief award for "Convolutionally Coded Unbalanced QPSK Systems," February 22, 1983. (with J. Yuen)
2. NASA Tech Brief award for "Improved Convolutionally Coded Unbalanced QPSK Systems," February 28, 1984. (with J. Yuen)
3. NASA Tech Brief award for "Trellis-Coded Modulation for 4800-9600 bps Transmission Over a Fading Mobile Satellite Channel," May 1987. (with M. Simon)
4. NASA Tech Brief award for "Multiple Trellis Coded Modulation (MTCM)," August 1987. (with M. Simon)
5. NASA Tech Brief award for "Generalized Multiple Trellis Coded Modulation (MTCM), October 1988. (with M. Simon)
6. NASA Tech Brief award for "Doppler Corrected Differential Detection," November 1988. (with M. Simon)
7. NASA Tech Brief award for "Trellis-Coded MDPSK System with Doppler Correction," March 1989. (with M. Simon)
8. NASA Tech Brief award for "Design of Trellis Codes for Fading Channels," April 1989. (with M. Simon)
9. NASA Tech Brief award for "Double Differential Encoding and Detection in MPSK," March 1989. (with M. Simon)
10. NASA Tech Brief award for "Fast Correction for Doppler in MDPSK Signals," May 1989. (with M. Simon)
11. NASA Tech Brief award for "The Use of Interleaving for Reducing Radio Loss in Trellis Coded Modulation Systems," June 1990. (with M. Simon)
12. NASA Tech Brief award for "Multiple Symbol Differential Detection of MPSK," June 1990. (with M. Simon)
13. NASA Tech Brief award for "Trellis Coded MDPSK with Multiple Symbol," June 1991. (with M. Simon)
14. NASA Tech Brief award for "Maximum-Likelihood Sequence Detection of Non-coherent Continuous Phase Modulation," 1993. (with M. Simon)
15. NASA Tech Brief award for "Multiple Symbol Partially Coherent Detection of MPSK," 1993. (with M. Simon)
16. NASA Tech Brief award for " Pseudo-Coherent Demodulation for Mobile Satellite Systems," 1995. (with M. Simon)
17. NASA Tech Brief award for "Trellis Coding of Two Consecutive Full Response 4-CPFSK

with Modulation Index 1/4," 1995. (with C. Weber and H. Lee)

18. NASA Tech Brief award for " A New Interference Cancellation Scheme with Parallel Processing for Code Division Multiple Access (CDMA) Applications," 1997. (with M. Simon and D. Raphaeli)

19. NASA Tech Brief award for "Multiple Turbo Codes for Deep-Space Communications," 1997. (with F. Pollara)

20. NASA Tech Brief award for " Turbo Coding and Decoding for Personal Communications," 1997. (with F. Pollara)

21. NASA Tech Brief award: "Serial Turbo Trellis Coded Modulation with Rate-1 Inner Code", February 2000. (with S. Dolinar, and F. Pollara)

22. NASA tech brief award: "A Reduced Complexity Highly Power/Bandwidth Efficient Coded FQPSK System with Iterative Decoding," M. Simon, D. Divsalar, November 12, 2003.

23. NASA tech brief award: "Iterative Demodulation and Decoding of Coded Non-Square QAM," L. Li, D. Divsalar, S. Dolinar, June 9, 2004.

24. NASA tech brief award: "Coupled Receiver-decoders for Low Rate Turbo Codes," J. Hamkins, D. Divsalar, June 9, 2004.

25. NASA tech brief award: "Accumulate-Repeat-Accumulate-Accumulate Codes," 2005.

26. NASA Tech Brief award: Protograph Based LDPC Constructed from Simple Loop Free Encoding Modules, 2005.

27. NASA tech brief award: "Protograph Based LDPC Codes with Minimum Distance Linearly Growing with Block Size," 2006.

28. NASA tech brief award: "ARA Type Proptograph Codes," November 2005.

29. NASA tech brief award: "ARA Type Proptograph Codes," April 2006.

30. NASA tech brief award: "ARA Type Proptograph Codes," May 2006.

31. NASA tech brief award: "Architecture of an Autonomous Radio," 2006.

32. NASA tech brief award: Rate Compatible Protograph LDPC Code Family with Linear Minimum Distance, 2007.

33. NASA tech brief award: A high speed concatenated Hamming and accumulator coded modulation scheme 2007.

34. NASA tech brief award: An LDPC-based code for optical communications, 2007.

35. NASA tech brief award: Combined GMSK Communications and PN Ranging, 2008.

36. NASA tech brief award: Short Protograph Based LDPC codes 2008.

37. NASA tech brief award: An LDPC based code for optical communications 2007.

38. NASA tech brief award: Bounded Angle Iterative Decoding of LDPC Codes April 1, 2009.

39. NASA tech brief award: Rate-Compatible LDPC Codes With Linear Minimum Distance, September 01 2009.

40. NASA tech brief award: LDPC-PPM Coding Scheme for Optical Communication, September 01 2009.

41. NASA tech brief : Encoders and Decoders for the AR4JA family of LDPC codes (to be awarded)

42. NASA tech brief : Performance and Complexity Estimates for Coded Two-Dimensional Modulations (to be awarded)

Patents

1. Trellis-Coded Modulation for Transmission-Over Fading Mobile-Satellite Channel," U.S. Patent No. 4,945,549, July 31, 1990. (with M. Simon)

2. Multiple Trellis Coded Modulation, U.S. Patent No. 4,922,507, May 1, 1990. (with M. Simon)
3. Trellis Coded Multi-level DPSK System with Doppler Correction for Mobile Satellite Channels , U.S. Patent No. 5,023,889, June 11, 1991. (with M. Simon)
4. Doppler-Corrected Differential Detection System, U.S. Patent No. 5,007,068, April 9, 1991. (with M. Simon)
5. Multiple Symbol Differential Detection, U.S. Patent No. 5,017,883, May 21, 1991. (with M. Simon)
6. Improved Parallel Interference Cancellation for CDMA Applications, U.S. Patent No. 5,644,592, July1, 1997. (with M. Simon and D. Raphaeli)

7. Hybrid Concatenated codes and Iterative decoding, A Patent filed May 15, 1996. U.S. Patent No. 6,023,783 February 8, 2000. (with F. Pollara)

8. Interleaved Serial Concatenation of Simple Component Codes and Associated Low-Complexity Iterative Decoding , U.S. Patent 7,089,477, August, 2006. (with H. Jin, R. J. McEliece)
9. Serial Turbo Trellis Coded Modulation Using a Serially Concatenated Coder, U.S. Patent 7,243,294 B1, July 10, 2007 (with F. Pollara, S. J. Dolinar)

10. ARA type protograph codes, D. Divsalar, A. Abbasfar, C. Jones, S. Dolinar, J. Thorpe, K. Andrews, K. Yao. US Patent 7343539 , March 11, 2008
11. Encoders for Block-Circulant LDPC codes, D. Divsalar, A. Abbasfar, C. Jones, S. Dolinar, J. Thorpe, K. Andrews, K. Yao, US Patent 7499490, March 3, 2009.

12. Rate Compatible Protograph LDPC Code Family with Linear Minimum Distance, US 2008/0294969 patent pending (with Dolinar, Jones).

13. Reduced Complexity Coding System Using Iterative Decoding, US Patent 7292654 , November 6, 2007 (with Simon).

14. Self-Configurable Radio Receiver, Patent Pending (with Hamkins, Simon, Dolinar, Tkacenkco).
15. Reduced Complexity Coding System Using Iterative Decoding, US Patent 7333571, February 19, 2008 (with Simon).

16. Interleaved Serial Concatenation Forming Turbo-like Codes, US Patent 7716552, May 11, 2010 (with McEliece, Jin, Pollara).

17. Reduced Complexity Coding System using Iterative Decoding, US patent 7693235, April 6, 2010 (with Simon).
18. Serial Turbo Trellis Coded Modulation using a serially concatenated coder, US patent

7770093, August 3, 2010 (with Dolinar and Pollara)

19. Rate-Compatible Protograph LDPC codes, US patent application and an international (PCT) application filed on June 10, 2011 by Caltech (pending) (with Thuy Van Nguyen, and Aria Nosratinia)

Publications **Textbook**

- *Introduction to Trellis Coded Modulation with Applications*, co-authored with E. Biglieri, P. McLane, M. K. Simon, MacMillan, 1991.

Book

- "Telemetry System," a chapter in "Deep Space Telecommunications systems Engineering," co-authored with J.H. Yuen, P.W. Kinman and M.K. Simon, edited by J. H. Yuen, Plenum Press, 1983.
- "Autonomous Software-Defined Radio Receivers for Deep Space Applications," contributed to two chapters, editors J. Hamkins, M. K. Simon, New Jersey, John Wiley and Sons, 2006.

Refereed Journal Papers

1. D. Divsalar and M. K. Simon, "Spectral Characteristics of Convolutionally Coded Digital Signals," IEEE Trans. on Communications, February 1980.
2. D. Divsalar and M. K. Simon, "The Power Spectral Density of Digital Modulations Transmitted Over Nonlinear Channels," IEEE Trans. on Communications, Vol. COM-30, January 1982.
3. D. Divsalar and J. H. Yuen, "Carrier Arraying with Coupled Phase-Locked Loops for Tracking Improvement," IEEE Trans. on Communications, Special Issue on Phase- Locked Loops, October 1982.
4. D. Divsalar, R. M. Gagliardi and J. H. Yuen, "PPM Performance for Reed- Solomon Decoding Over an Optical-RF Relay Link," IEEE Transactions on Communications, March 1984.
5. D. Divsalar, M. K. Simon and J. H. Yuen, "Trellis Coding with asymmetric Modulations," IEEE Transactions on Communications, Vol. COM-35, No. 2, February 1987.
6. D. Divsalar and M. K. Simon, "Trellis Coded Modulation for 4800-9600 bps Transmission Over a Fading Mobile Satellite Channel," Special Issue on Fading Channels of the IEEE Journal on Selected Areas in Communications, Vol. SAC-5, No. 2, February 1987, pp. 162-175.
7. D. Divsalar and M. K. Simon, "Multiple Trellis Coded Modulation (MTCM)," IEEE Transactions on Communications, April 1988.
8. M. K. Simon and D. Divsalar, "The Performance of Trellis Coded Multilevel DPSK on a Fading Mobile Satellite Channel," IEEE Trans. on Vehicular. Tech., May 1988.
9. M. K. Simon and D. Divsalar, "Doppler Corrected Differential Detection of MDPSK," IEEE Trans. on Comm., February 1988.
10. D. Divsalar and M. K. Simon, "The Design of Trellis Codes for Fading Channels: Performance Criteria," IEEE Transactions on Communications, Vol. COM-36, No. 9, September

1988.

11. D. Divsalar and M. K. Simon, "The Design of Trellis Codes for Fading Channels: Set Partitioning for Optimum Code Design for MPSK Signals," IEEE Transactions on Communications, Vol. COM-36, No. 9, September, 1988.

12. D. Divsalar and M. K. Simon, "The Use of Interleaving for Reducing Radio Loss in Trellis Coded Modulation Systems," IEEE Transactions on Communications, Vol. 38, No. 3, August 1990.

13. D. Divsalar and M. K. Simon, "Multiple Symbol Differential Detection of MPSK," IEEE Transactions on Communications March 1990.

14. D. Divsalar, M. K. Simon and M. Shahshahani, "The Performance of Trellis Coded MDPSK with Multiple Detection," IEEE Transactions on Communications, September 1990.

15. J. H. Yuen, M. K. Simon, W. Miller, F. Pollara, C. R. Ryan, D. Divsalar and J. Marakis, "Modulation and Coding for Satellite and Space Communications," proceedings of the IEEE, Vol. 78, No. 7, July 1990.

16. M. K. Simon and D. Divsalar, "On the Implementation and Performance of Single and Double Differential Detection Schemes," IEEE Transactions on Communications, February 1992.

17. M. K. Simon and D. Divsalar, "Maximum-Likelihood Sequence Detection of Non coherent Continuous Phase Modulation," IEEE Transactions on Communications, January 1993.

18. M. K. Simon and D. Divsalar, "Multiple Symbol Partially Coherent Detection of MPSK," IEEE Transactions on Communications, February 1994.

19. D. Divsalar and M. K. Simon, "Maximum-Likelihood Differential Detection of Uncoded and Trellis Coded Amplitude-Phase Modulation Over AWGN and Fading Channels, Metrics and Performance," IEEE Transactions on Communications , January 1994.

20. H. Lee, D. Divsalar and C. Weber, "Multiple Symbol Trellis Coding for Full Response CPFSK" IEEE Transactions on Communications, May 1996.

21. S. Benedetto, D. Divsalar, G. Montorsi and F. Pollara, " Bandwidth Efficient Parallel Concatenated Coding Schemes," IEE Electronics Letters, November 1995, Vol. 31, No. 24.

22. S.Benedetto, D. Divsalar, G. Montorsi and F. Pollara, "A new algorithm for continuous decoding of turbo codes," IEE Electronics Letters, Feb. 1996.

23. D. Divsalar, and R. J. McEliece, " The Effective Free Distance of Turbo Codes," IEE Electronics Letters, February 96.

24. S. Benedetto, D. Divsalar, G. Montorsi, and F. Pollara, "Serial Concatenation of Interleaved Codes: Performance Analysis, Design, and Iterative Decoding," IEEE Transactions on Information Theory , May 1998.

25. S. Benedetto, D. Divsalar, G. Montorsi, and F. Pollara, "Soft Input Soft Output APP Module for Iterative Decoding of Concatenated Codes," IEEE Communications Letters January 1997.

26. M.K. Simon, and D. Divsalar, "On the Optimality of Classical Coherent Receivers of Differentially Encoded M-PSK," IEEE Communications Letters, May 1997.

27. S. Benedetto, D. Divsalar, G. Montorsi, F. Pollara, " Analysis, Design, and Iterative Decoding of Double Serially Concatenated Codes with Interleavers". IEEE Journal on Selected Areas in Communications, Special Issue on Concatenated Coding Techniques and Iterative

Decoding: Sailing Toward Channel Capacity, February 98.

28. S. Benedetto, D. Divsalar, G. Montorsi, F. Pollara, "Soft-Input Soft-Output Modules for the Construction and Distributed Iterative Decoding of Code Networks," European Transactions on Telecommunications, March-April 98 (invited paper).

29. M.K. Simon, D. Divsalar, "Some New Twists to Problems Involving the Gaussian Probability Integral," IEEE Transaction on Communications, February 1998.

30. D. Divsalar, M.K. Simon, and D. Raphaeli, "Improved Parallel Interference Cancellation for CDMA," IEEE Transaction on Communications, February 1998.

31. D. Raphaeli, and D. Divsalar, " Multiple-Symbol Noncoherent Decoding of Uncoded and Convolutionally Coded Continuous Phase Modulation," Journal of Communications and Networks, December 1999.

32. D. Divsalar, S. Dolinar, and F. Pollara,"Iterative Turbo Decoder Analysis Based on Density Evolution," IEEE Journal on Selected Areas in Communications, Vol. 19, No. 5, pp 891-907, May 2001.

33. R. Garello, G. Montorsi, S. Benedetto, D. Divsalar, F. Pollara, "Labelings and Encoders with the Uniform Bit Error Property with Applications to Serially Concatenated Trellis Codes," IEEE Transaction on Information Theory, Jan. 2002.

34. Sason, I.; Shamai, S.; Divsalar, D., "Tight exponential upper bounds on the ML decoding error probability of block codes over fully interleaved fading channels", IEEE Transactions on Communications , Volume: 51 , Issue: 8 , Aug. 2003, Pages:1296 - 1305.

35. Benedetto, S.; Montorsi, G.; Divsalar, D. "Concatenated convolutional codes with interleavers," IEEE Communications Magazine,Volume: 41 , Issue: 8 , Aug. 2003 Pages:102 - 109

36. D. Divsalar, E. Biglieri, " Upper bounds to error probabilities of coded systems beyond the cutoff rate," IEEE Transaction on Communications, December 2003.

37. L. Li, D. Divsalar, S. Dolinar, "Iterative Demodulation, Demapping, and Decoding of Coded Non-Square QAM,", IEEE Communications Letters, January 2005.

38. A. Abbasfar, D. Divsalar, K. Yao, " Accumulate-Repeat-Accumulate Codes", IEEE Transaction on Communications, April 2007.

39. Simon, M.; Divsalar, D.; ``Some Interesting Observations for Certain Line Codes With Application to RFID", IEEE Transactions on Communications, Volume 54, Issue 4, April 2006.

40. K. Andrews, D. Divsalar, S. Dolinar, J. Hamkins, C. Jones, and F. Pollara,"The Development of Turbo and LDPC Codes for Deep Space Applications," IEEE proceedings Vol. 95, No. 11, November 2007.

41. A. Abbasfar, D, Divsalar, K. Yao, "Reflections on ARA codes," IEEE Information Theory Newsletter, December 2008.

42. D. Divsalar, S. Dolinar, C. Jones, and K. Andrews,`` Capacity Approaching Protograph Codes," IEEE Journal of Selected Areas in Communications, Febraury 2009.

43. M. Barsoum, B. Moision, M. Fitz, D. Divsalar, J. Hamkins, "Iterative Coded Pulse-Position-Modulation for Deep-Space Optical Communications, " IEEE Transactions on Communications, December 2010.

44. Shadi Abu-Surra, Dariush Divsalar, and William Ryan, "Enumerators for Protograph-Based Ensembles of LDPC and Generalized LDPC Codes," IEEE Transactions on Information Theory, February 2011.

45. O. Y. Bursalioglu, G. Caire, and D. Divsalar, "A Robust Deep Space Image Transmission

Scheme based on Rateless Codes," IEEE Trans. on Communications (to be submitted)

46. Thuy Van Nguyen, Aria Nosratinia, D. Divsalar, "The Design of Rate-Compatible Protograph LDPC codes," IEEE Transactions on Communications (Submitted January 4, 2011)

Refereed Conference Papers

1. D. Divsalar and J. K. Omura, "Computational Cut-off Rate for Band limited Linear and Nonlinear Channels Under Mismatch Conditions," Proceedings of Conference on Information Sciences and Systems, Johns Hopkins University, March 1978.
2. D. Divsalar and J. K. Omura, "Performance of Intersymbol Interference Channels Under Mismatch Conditions," Proceedings of the IEEE International Conference on Communications, Toronto, Canada, June 1978.
3. D. Divsalar and J. K. Omura, "Performance of Mismatched Viterbi Receiver on Satellite Channels," Proceedings of the IEEE International Conference on Communications, Boston, Mass. 1979.
4. D. Divsalar and J. K. Omura, "A Computational Algorithm for Determining Convolutional Code Distances," Proceedings of the 1979 International Symposium on Information Theory, Italy, June 1979.
5. D. Divsalar and J. H. Yuen, "Performance of Unbalanced QPSK in the Presence of Noisy Reference and Crosstalk," Proceedings of the IEEE National Telecommunication Conference, Washington, D.C., November 1979.
6. D. Divsalar and J. H. Yuen, "Performance of Convolutionally Coded Unbalanced QPSK Systems," Proceedings of the IEEE National Telecommunications Conference, Houston, Texas, November 1980.
7. D. Divsalar and J. K. Omura, "Effects of ISI on Viterbi Decoding," Proceedings of the IEEE 1981 International Symposium on Information Theory, Santa Monica, CA, February 12-19, 1981.
8. D. Divsalar and M. K. Simon, "Performance of Quadrature Overlapped Raised Cosine Modulation Over Nonlinear Satellite Channels," Proceedings of the IEEE International Conference on Communications, Denver, Colorado, June 1981.
9. D. Divsalar and J. H. Yuen, "A Coupled Phase-Locked Loops System for Carrier Tracking Improvement," Proceedings of the IEEE International Conference on Communications (ICC), June 13-17, 1982.
10. M. K. Simon, J. K. Omura and D. Divsalar, "Performance of Staggered Quadrature Modulations Over Nonlinear Satellite Channels with Uplink Noise and Intersymbol Interference," Proceedings of the IEEE GLOBECOM '82, Miami, Florida, November 1982.
11. D. Divsalar, R. M. Gagliardi and J. H. Yuen, "Demodulation of Pulse Position Modulation for Reed-Solomon Coded Optical Space Channel," Proceedings of the IEEE GLOBECOM '82, Miami, Florida, November 1982.
12. D. Divsalar and M. K. Simon, "Effects of Mismatch on Coded Communications Systems," IEEE Thirteenth Annual Communication Workshop, Naples, Florida, April 24- 27, 1983.
13. D. Divsalar and M. K. Simon, "Effects of ISI and Satellite Channel Non linearity on Viterbi Demodulation/Decoding," Proceedings of the IEEE International Conference on Communications, Boston, Mass., June 19-22, 1983.
14. D. Divsalar and J. H. Yuen, "Asymmetric MPSK for Trellis Codes," Proceedings of the

IEEE GLOBECOM'84, November 26-29, 1984.

15. D. Divsalar, "JPL's Mobile Communication Channel Software Simulator," Proceedings of the Propagation Workshop in Support of MSAT-X, January 30-31, 1985, JPL Internal Document D-2208, January 1985.

16. D. Divsalar and M. K. Simon, "Trellis Coding with Asymmetric Signal Sets," Proceedings of IEEE Information Theory Symposium, Brighton, England, June 24-28, 1985.

17. D. Divsalar and M. K. Simon, "combined Trellis Coding with Asymmetric Modulations," presented at the 15th IEEE Communication Workshop, Sanibel Is, Florida, April 21-24, 1985, Proceedings of GLOBECOM'85, New Orleans, December 2-5, 1985.

18. S. A. Townes and D. Divsalar, "Near-Toll Quality Digital Speech Transmission in the Mobile Satellite Service," Proceedings of the IEEE International Communications Conference (ICC'86), Toronto, Ontario, Canada, June 1986.

19. D. Divsalar and M. K. Simon, "Multiple Trellis Coded Modulation (MTCM)," Proceedings of the IEEE Global Telecommunications Conference, Houston, Texas, December 1-4, 1986.

20. D. Divsalar, "Trellis Coded Modulation for Mobile Satellite Communications," Proceedings of the National Radio Science Meeting (URSI), Boulder, Colorado, January 12-15, 1987.

21. D. Divsalar and M. K. Simon, "Multiple Trellis Codes for Satellite Channels," presented at 1987 IEEE Communication Theory Workshop, Howey-in-the-Hills, Florida, April 26-29, 1987.

22. M. K. Simon and D. Divsalar, "The Performance of Trellis Coded Multi-level DPSK on a Fading Mobile Satellite Channel," Proceedings of the IEEE ICC'87, June 7- 10, Seattle, Washington.

23. M. K. Simon and D. Divsalar, "Open Loop Frequency Synchronization of MDPSK with Doppler," Proceedings of the IEEE ICC'87, June 7-10, Seattle, Washington.

24. D. Divsalar and M. K. Simon, "Generalized Multiple Trellis Coded Modulations (MTCM)," Proceedings of the IEEE ICC'87, June 7-10, Seattle, Washington.

25. M. K. Simon and D. Divsalar, "Multiple Trellis Coded Modulation (MTCM) Performance on a Fading Mobile Satellite Channel," Proceedings of the IEEE GLOBECOM'87, November 1987, Tokyo, Japan.

26. W. Rafferty and D. Divsalar, "Modulation and Coding for Land Mobile Satellite Channels," Proceedings of the IEEE ICC '88, Philadelphia, PA, June 1988.

27. D. Divsalar and M. K. Simon, "Trellis Coding for MSAT Channels," presented at 1988 IEEE Communication Theory Workshop, Sedona, AZ, April 17-20, 1988.

28. D. Divsalar and M. K. Simon, "Trellis Coded MPSK Modulation Techniques for MSAT-X," Proceedings of the Mobile Satellite Conference, May 3-5, 1988, JPL Publication 88-9, May 1988.

29. D. Divsalar, M. K. Simon and T. Jedrey, "Trellis Coding Techniques for Mobile Satellite Communications," Proceedings of the 1988 IEEE Military Communications Conference, October 23-26, 1988, San Diego, CA.

30. D. Divsalar and M. K. Simon, "Performance of Trellis Coded MDPSK on Fast Fading Channels," to be presented at the 1989 IEEE International Conference on Communications, Boston, June 1989.

31. D. Divsalar and M. K. Simon, "Trellis-Coded Modulation with Multiple Symbol Detection," presented at 1990 IEEE Communication Theory Workshop, June 1990, Santa Barbara.

32. D. Divsalar, M. K. Simon, T. Jedrey, N. Lay and W. Rafferty, "Combined Trellis Coding with Feed forward Processing for MSS Applications," presented at IMSC'90, Ottawa, Canada, June 17-20, 1990.

33. T. Jedrey, N. Lay, J. Parkyn and D. Divsalar, "Description and Performance of an Advanced Digital Mobile Terminal," IMSC'90, Ottawa, Canada, June 17-20, 1990.

34. D. Divsalar, "Trellis Coding for a Fading Channel with Multisymbol Differential Detection," presented at 1991 IEEE Communication Theory Workshop, Rhodes, Greece, June 30-July 6, 1991 (invited paper).

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